No. 231 SEPTEMBER 2005

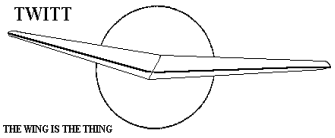
T.W.I.T.T. NEWSLETTER

An Aeriane SWIFT that belongs to Ken Dawe on display at the 2005 ESA Western Workshop
See page 4 for more photos and the details on Ken's ultralight

T.W.I.T.T.
The Wing Is The Thing
P.O. Box 20430
El Cajon, CA 92021

The number after your name indicates the ending year and month of your current subscription, i.e., **0509** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, September 17, 2005, beginning at 1:30 pm at hanger A-4, Gillespie Field, El Cajon, CA (first hanger row on Joe Crosson Drive - Southeast side of Gillespie).



THE WING IS THE THING (T.W.I.T.T.)

T.W.I.T.T. is a non-profit organization whose membership seeks to promote the research and development of flying wings and other tailless aircraft by providing a forum for the exchange of ideas and experiences on an international basis. T.W.I.T.T. is affiliated with The Hunsaker Foundation, which is dedicated to furthering education and research in a variety of disciplines.

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Meetings are held on the third Saturday of every other month (beginning with January), at 1:30 PM, at Hanger A-4, Gillespie Field, El Cajon, California (first row of hangers on the south end of Joe Crosson Drive (#1720), east side of Gillespie or Skid Row for those flying in).

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PRESIDENT'S CORNER

Sorry about the newsletter being a little late this month, but things around here have been very busy and I just got behind in my writing chores.

I was pleased to see that three of our members were included in the just completed ESA Western Workshop that is overseen by Bruce Carmichael. Bob Chase talked about his choice for a motorglider (Soaring Gull), Dominique Velliard gave a presentation on his Impulse Theory of Dynamic Soaring, and Phil Barnes gave a shortened version of his Flight of the Albatross presentation. All were well received by the large group of homebuilders and aviation enthusiasts.

Dominique really stole the show with his demonstrations using simple things you can find around the house, like a wooden salad bowl, tennis balls, basketball and string. The one that really got the WOW factor from everyone involved the basketball and tennis ball. You can do the same thing to see what got their attention. Hold the basketball about waist high, then hold the tennis ball about 6-8 inches directly above it. Simultaneously drop both balls and watch the results. It is a great demonstration of the transfer of energies between two bodies and helped to illustrate Dom's point about his theories on dynamic soaring.

There were many other great presentations that were put together by Bruce and his new assistant Al Bowers. Al actually facilitated the sessions this year and did a great job, as with everything he does. There was a definite trend toward motorgliders with an update on the motorized version of the Sparrow Hawk, Bob's Soaring Gull, Jack Norris on propeller theory and, Art Canning on the CUMULUS. This reflected what I saw at the SSA convention in January with the large number of motorgliders sitting on the display floor.

Andy

SEPTEMBER 17, 2005 PROGRAM

With all that has been going on, I was unable to pull together a program for this month. We will still be at the hanger if you would like to drop by and just visit or talk about aviation things.

We are having some preliminary discussions with a Mitchell B-10 owner in the Los Angeles area that may be able to give us a talk about his aircraft at the November 19th meeting. He has some video and would like to have a good question and answer session to make things interesting.

So mark you calendars for November 19th and start putting your list of questions together on the B-10.

LETTERS TO THE EDITOR

August 12, 2005

Flying Wing info

Hello,

I was reading at twitt.com that you at one time were looking into a flying wing ultra light. I myself have been looking at doing the same thing. I was wondering how far you had gotten, what set backs and things you have encountered? Any pictures?

Thanks,

Ryan Tasma
<Ryan.Tasma@Siemens.com>

(ed. – Somehow I think this one got by me as I was filtering messages among a big batch of Nurflugel items. I am not quite sure what he is referencing, since there was never a published plan on building an ultralight version of any of the concepts that were discussed in the early days of TWITT.

I will get back to him with this information, but if anyone has a good line on what could be considered a current ultralight flying wing, we would all like to find out more about it.)

August 16, 2005

Hello- Regarding the question posed in the August, 2005 TWITT Newsletter, "Is the Space Shuttle obsolete?" The Saturn V seems to be able to get to the point of what the current and near future missions will be, that is putting equipment in orbit to be bolted to the International Space Station and placing more telemetry equipment on Mars. Personally I would like to see a skew in mission objective towards Far Side of Sun observation. We here on Earth have had several fly-bys of large chunks of stuff that, while there was no danger of collision, came close enough to imbue some with a recognition of their own mortality. An early warning of the trajectory might be called for.

Getting back to the subject of winged vehicles, the study of Mars might be enhanced by the capability of some glider able to cover planet surface at a lower altitude than an outer atmosphere orbiting vehicle and be able to work in conjunction with surface based, orbiting and Earth based stations.

Regards,

Henry E. Whittle
<Gulfrose@Juno.com>

(ed. – Thanks for the comments on the letter submitted to Nurflugel and supplemented by Al Bowers. I will make sure it is passed along to that group.

An interesting side note to the ESA Western Workshop over Labor Day weekend was how either dynamic soaring, regenerative electric flight or some type of autonomous flight would be used for exploring planets like Mars on future missions. Al Bowers was there taking it all in, which sort of provides a conduit to the bureaucracy of getting such programs on the funding list.)

August 30, 2005

Konig Radial Engine Information

I happen to own a Konig 3 cylinder Radial engine on my Monerai motorglider and was wondering if anyone had information concerning parts availability/ maintenance manuals for said engine. Please contact me at rick.cahill@gte.net.

Thank you for any assistance you can give me.

Richard Cahill
<rick.cahill@gte.net>

(ed. – This is a little out of the flying wing realm, but the message come in through TWITT versus ESA so I thought I would include it and see if anyone can help.)

September 2, 2005

Horten IV drawings

I am interested in building a scale model of the Horten IV and would like to know if there are drawings available in any format? Everything that I've flown as a glider pilot and instructor has been fairly conventional to date. The Horten IV really piqued my curiosity when I saw it at the Udvar-Hazy museum last week; it's got very classic lines as well. I appreciate your offer to look around for me.

Regards,

Mike Morgulis
Toronto, Canada
<mike.morgulis@sympatico.ca>

(ed. – We are not aware of any model plans for the Horten IV, but do know that some people have built their own versions. I asked Al Bowers about this and he also didn't have a source. So, if anyone out there has come across any type of plans for the H IV, please let us know.)

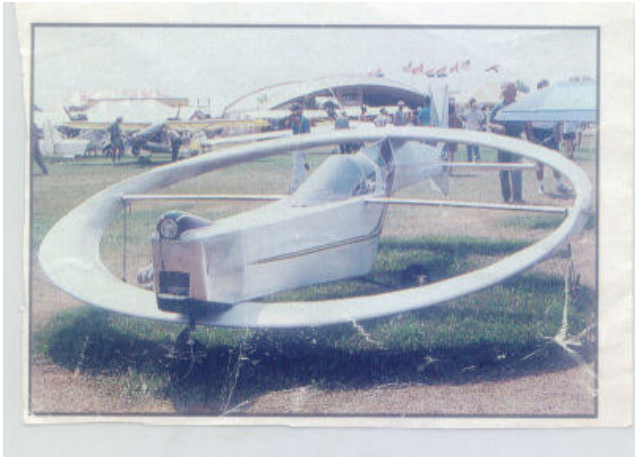
September 5, 2005

Hello, my name is Geoff, and I am looking for information on the attached image. All I know is that it was taken at Oshkosh some years ago. I cannot Google it as I do not know what to call it.

Many thanks

Geoff Dunn
<geo@intekom.co.za>

(ed. – I know some of our members attend Oshkosh on a regular basis and perhaps one of you remember seeing this – top of right column - and have a name to put with it. If so, please drop Geoff and us a line with the info.)



September 6, 2005

Mitchell B-10

I have decided to donate my B-10 to charity for the tax write-off. Let me know if you know of a good one who might pass it along to someone who will finish it. I would like to see it fly. 80% complete, Zenoah engine with Kasperwing re-drive, Patmont cage (no gas tank, no seat, no prop, no muffler, no instruments, no wheels). Have any interested call me at 916-722-9692. The plane is located in my garage in Sacramento.

Vic Gibson
APilot@webtv.net

(ed. – I wrote back saying I wasn't aware of any charities at this point in time and, that he may have trouble finding a charity that would actually complete the build. I did suggest he look into a museum like Planes of Fame that restore and build aircraft. The liability issues involved almost certainly put a charity group out of the picture.

If anyone knows of a charity or museum in the California area that would take the B-10 and put it in the air, please let us know.)

KEN DAWE'S AERIANE "SWIFT"

One of the first aircraft to greet me when I arrived at the Mountain Valley Airport for the 2005 ESA Western Workshop was Ken Dawe's SWIFT ultralight flying wing. This is one that has been imported from Belgium and is very nicely finished, which you can't really tell from the pictures I took. It was originally a sailplane and Ken later added the engine. Ed Labhan

and I spent a little time talking with Ken about how he likes the SWIFT and what kind of performance he thinks he is getting.

Ken noted that adding the engine didn't seem to make much of a difference as far as he could tell other than increasing the stall speed slightly. He thinks he is getting an L/D of about 20:1 although he has not had an opportunity to verify it through testing. He estimated the sinking speed at about 120 fpm based on a weight of about 248 lbs with the engine.

ABOVE: A shot of the wing tip showing the small wheel for ground handling and the split winglet that includes the drag rudder. The rudders only move in the outward direction and can both be deployed at the same time as a glide path device, although the flaps are really the primary control for that purpose.

BOTTOM LEFT: This is a shot of cockpit pod, which had some very nice metal work in terms of the steel tubing and welding. The rudder pedal area is a little small for anyone with large feet or big boots. The boom out the left side goes to the instrument cluster that also monitors the engine. The plastic glass surrounding the pod was very clear and opened up down the left side with Velcro for easy entry. The glass wraps around to the top where it is zippered up from the inside. The pod also has the doors for foot launching, which Ken has done when it was a pure sailplane.

ABOVE: This is the left side of the engine with a good shot of the folding propeller. The engine is a SOLO made in Germany and is 210 cc, 2 stroke, 1 cylinder rated at 18 hp. The propeller is a French Airplast that uses elastic cord to pull the blades in when the engine is shut down. Ken indicated it gives him about 55 mph at mid-range cruise RPM. The gas tank is relatively small so it is not designed for long cruises, but rather as a self-launcher with some capability to recover from landing in a bad field. You can also see the gravel protector behind the wheel to keep it out of the propeller during launch. Al Bowers commented on the un-aerodynamic nature of such a device and its impact on performance.

TOP LEFT – next page: This is a shot of the right side of the engine showing the muffler arrangement. Ken indicated it was relatively quiet when running and the muffler is sufficiently tucked away to not cause a lot of extra drag. Overall, the engine is a very clean installation and, Ken said it could be removed so the aircraft was restored to an un-powered sailplane, which might still be a little too heavy for foot-launching.

(ed. - The following items were taken from the Nurflugel group bulletin board.)

August 18, 2005

Greetings,

I have fallen in love with the Horten hang gliders. I was wondering if anyone has any information regarding the availability of plans for these beautiful craft.

Thanks

Michael A
<matwell@exemail.com.au>

From: Leonardo Acevedo
<leonardoacevedo@gmail.com>

Hello Michael:

I am doing my thesis about the Ho-Xb. Part of this work is to make the plans of the exterior shape of the hang glider, but it means we won't make the plans of the interior, that is, the structural parts and the kinematics chain of the elevons. I will put it on the net when I finish my thesis, so if you can wait a pair of months, you can have it.

I've spoken with the owner and constructor of Ho Xa and b, and the plans of the Ho Xa got lost and the hang glider get destroyed, so there are no plans about it. The Ho Xb is at the National Museum of Aeronautics in Argentine and we went there to measure it. For the Ho Xc, I don't have information.

Hallo,

I am proud to say I finished my new version of my site "Nest of Dragons". You would really help me by changing your link to my site into:

www.nestofdragons.com

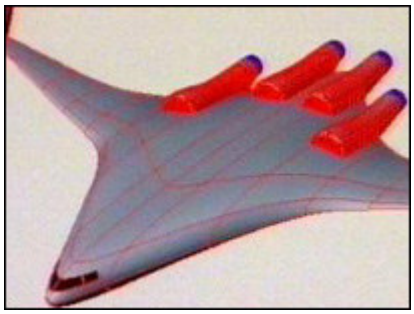
E-mail stays the same. I guess my link stands at the Debreyer pages (Pelican)

Keep that brain spawning wings,

Koen Van de Kerckhove
<k.vandekerckhove@skynet.be>

New Flying Wing Design Silent Craft Design Launched
From: evolbaby@aol.com

http://news.bbc.co.uk/1/hi/england/beds/bucks/herts/4158802.stm



(ed. – Obviously, this is a variation of the blended wing body design that has been experimented with by NASA.)

From: Larry Witherspoon
<ssspoon@aol.com>

Another Silent Planes article

The silent planes of the future seem to be based on McDonnell Douglas' now Boeings' Blended Wing Body (BWB) which I crab to Boeing heads for not pushing harder to get the design into service every chance I get.

Now Boeing has been put in the back seat, with Airbus ahead with a Superjumbo. The Blended Wing Body could hold more passengers than the A380 in a footprint (wingspan) smaller than a 747 so we wouldn't have to rebuild the terminals to accommodate it.

But there are social problems predicted. Will the public accept a plane with very few windows? Heck, only the window seat passenger has any advantage from a window now. However many believe it is important that people be able to look across the room and see a window. I think individual monitors will do the trick.

And I'm starting to believe a smaller BWB will be marketed into existence by the airlines due to additional fuel efficiency more so than potential capacity. I don't think people are going to want to sardine into an aircraft with seven or eight hundred other people after the novelty of the Superjumbo wears off.

Then beyond the social problems I understand there is an engineering problem with pressurizing something as big as the interior of a BWB cabin, which will not have a tubular cross section. Heck don't pressurize the cabin just heat it, and divert engine bypass air and give everybody their own SCABA mask, a Self Contained Aircraft Breathing Apparatus, the in-flight equivalent of a divers SCUBA mask. What's that? Did I hear somebody say that would never fly? That's what they said about something two brothers in the bicycle business were tinkering with about 100 years ago. (ed. - He also attached the following.)

Silent planes 'Will Fly in 20 Years'
The Guardian (UK) 08/19/05
Author: Alok Jha
Copyright (C) 2005 The Guardian; Source: World Reporter (TM)

The world's first silent airplanes could be flying almost undetected across the sky within 20 years after engineers at Cambridge University unveiled their concept design.

The aircraft, with four engines on top of a wing-shaped fuselage, should be so quiet no noise would be heard outside an airport's perimeter.

"The basic concept is a flying wing with the engines mounted on top of the aircraft," said Paul Collins, the project manager of the Silent Aircraft Initiative, a collaboration between Cambridge University and the Massachusetts Institute of Technology.

"The airframe itself will then shield the ground from the noise. We then embed the engine in the aircraft, which allows us to put silencers in the ducting that leads on to the engine and away from it. That makes it quiet on take off."

Another noise reduction technique is to make the fuselage more streamlined.

"The reduction in engine noise over the past 40 years has been so substantial that the aircraft itself is making as much noise as the engine," Mr Collins said. "The turbulence around the aircraft, the undercarriage and all the flaps create as much noise as the engines. What we now need to do is to silence those as well."

The £2.3m, three-year project will finish next year, after, which the industrial partners, including Rolls-Royce and Boeing, could begin to work on prototypes.

Northrop YB-49 Flying Wing Featured In New Stamp Collection
From: evolbaby@aol.com

http://www.picayuneitem.com/articles/2005/08/13/news/27liberator.txt

According to the article many memorable aircraft will be featured in this new stamp series.

I for one will be getting them.

Greg

From: Mark Nankivil
<nankivil@covad.net>

These have been available for a few weeks now in the St. Louis area - very good looking and I for one will buy additional sheets and stash them away for use on my mail to my aviation friends!

Flair 30 Mishap

From: Nicholas Cafarelli
<nicke@yahoo.com>

At the link below

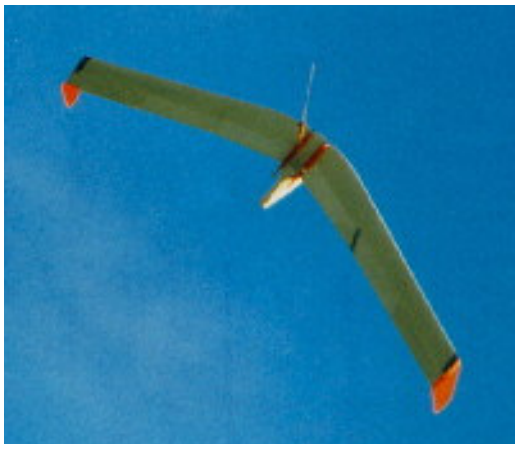
http://midtoad.homelinux.org/midwinter.ca/RigidWings/flair30.htm

they mention that the Flair 30 flew 50 hours without mishap. Sadly, then someone "might" have experienced control reversal.

I am trying to contact Knut Von Hentig - http://www.glidingwa.com.au/Roster.htm - to find out more.

Might anyone on the list have more information?

Flair flying over the Alps.



1/10 scale model of the Flair

From: Jim Sparks
<spider@candw.lc>

I just thought that everyone might like to see this.

From: Atlantica-owner@list.wingco.com
To: 'Friends of Atlantica'
Subject: Brief up date plus new Atlantica LSA

Hi,

Right now I'm dismantling the mock up so I can use its main gear on the Atlantica 250 prototype. This will also provide more hangar space for the rebuild as well as other revenue producing jobs.

The mock up will need refurbishing if we ever need it for marketing anyway so for now its components are going in vertical storage. I'm anxious to get the proto back on the gear so we can run un-pickle and run the engine.

The Atlantica 250 kit is still the primary focus and starting point in our business plan. Since the Atlantica's conception the market has changed to favor certified aircraft but the kit is still the best way to get there. Epic aircraft is a good example of this approach. They may not make that many kits or even make money on them but it is the most economical way to get production started and refinements made before the design is "cast in stone" certified.

I'm also looking at another potential direction based the new LSA ruling and rising fuel cost. Pictured is just a first iteration that is on my drawing board now is a little trimmer and looks much better. It is different from the Atlantica 250 in many ways other than it half the weight and less than half the power. The pilots sit more upright and more forward with a hinge forward canopy for simple construction and easy access. The centerbody is 10' wide so the strakes include the 14 gal fuel tanks on each side (6+ hours) and huge baggage areas behind and to the sides of the seats. The outer wing panels are very simple close molded solid core. The aerodynamics are mostly early 40's Horton including the rudder/spoilers. Pushing both rudder pedals at the same time works like spoilers on a glider and used independently they will knock this little floaters wing down in a cross wind pretty good.

Pictured (ed. the picture didn't come through the bulletin board and I couldn't find one on the Wingco website) is a 1/12th scale model with an old airfoil, 31' span and 48" tall cabin. The new version uses a NACA airfoil that has less rotational moment (almost none) and lower drag. The little 31" X 21" engine and 60" prop allows the prop to be right on the center of pressure without a tall gear. The new airfoil's profile provides just as much head and foot room with only a

45" tall cabin. With 9' outer wing panels we have a 28' span that does 120 knots IAS (161 mph true) at 8,500'. The LOM specs show about 50hp at .45 lbs of fuel per hp/hour at this altitude which comes out to better than 40 mpg. With 14' outer wing panels we have a 38' span "motor glider" that should true at 150 mph at 12,500 burning about 3 gals per hour..50 mpg. It is an interesting design study. It will be interesting to hear your response.

Don't worry, the Atlantica 250 kit is still our primary focus.

Alan Shaw

From: Brunno Barreto
<brunno04017@yahoo.com>

Subject: High Lift Airfoils

I am searching for high lift (high drag) airfoils for "nurflügel" usage. I´m designing a flying wing based on the Horten transport plane A.e 38, which will participate on the next SAE aero design contest. Any help is greatly appreciated.

From: Bruno
<msmprod@optushome.com.au>

If you do not wish to use the original, some of the thicker Fauvel airfoils will do.

From: Barreto

Thank you. Do you know the original IAe 38 airfoil ?

From: Bruno

As far as I know, it was very similar to the tailless 4 engine bomber (30 m wingspan) designed by Reimar Horten in 1950. The IAe 38 was built as a single prototype in Argentina in 1959. It apparently flew well. Try:

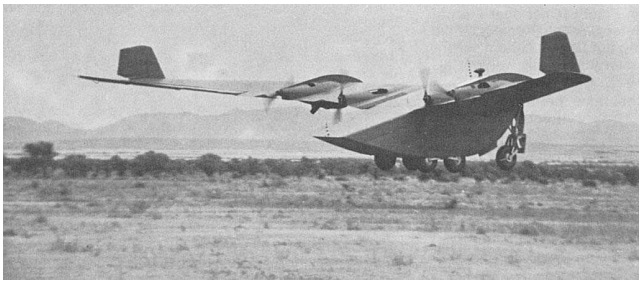
http://www.geocities.com/unicraftmodels/germ/ho38/ho38.htm.

The only person that I can think of who has an extended knowledge about Horten wings is Al Bowers, the famous designer and head of the shuttle program. You can ask him about it. He is a member of this group.

I found the airfoil for you:

http://www.nurflugel.com/Nurflugel/Horten_Nurflugels/horten_nurflugels.html

and click on the photo of the design at the bottom of the page.



(ed. – Although there is a data table if you click on the Background and Data Table line at the top of the pictures, I couldn't find an airfoil definition in the table. There were some dimensions, but no designation.

From: Del Brengman
<DBrengman@aol.com>

Where will the SAE contest take place and what date?

From: Brunno

The SAE contest is scheduled for September 23-25 in Brazil, South America.

From: Don Stackhouse
<djaerotech@erinet.com>

I don't have the current rules for this handy, although I am familiar with earlier SAE aircraft competitions, and was a judge for one of them not all that long ago. If the size of your model is about the same as in previous years, then that 18% thick airfoil is likely to be little more than a blunt instrument for beating the air into submission.

At model aircraft Reynolds numbers, you generally need something a lot thinner and with less camber, particularly if you have to operate over a variety of lift coefficients. In fact, at low Reynolds numbers having too much thickness results in not just a loss of efficiency, but in a loss of max lift coefficient. Too much thickness results in too much adverse pressure gradient on either the upper, lower or both surfaces simultaneously. This causes separated flow on one or both surfaces, with a loss of lift and a big increase in drag.

Take a look at some of Michael Selig's, Martin Hepperle's and Mark Drela's airfoils for something that is designed to work well at these Reynolds numbers.

From: Colin Weir
<weirc@deeside.ac.uk>

Subject: Barnes Wallis, Swallow

Hi List, mention of Barnes Wallis recently led me to recall his Swallow project, a variable geometry supersonic flying wing. I am not aware of a V.G. flying wing that has flown,(other than models) any comments? I believe that a small manned demonstrator was designed and assembled for the Swallow project but not flown.

From: Huckebein
<milartjj@aol.com>

I recall one of the last TV programs made by Barnes Wallis in the late 60's or early 70's shown then on BBC TV in UK, was mostly about Supersonic aerodynamics and the 'Swallow'. Would be good to find a copy on video.....

From: Marc de Piolenc
<fmdepiolenc@yahoo.com>

Subject: Variable-geometry flying wings?

Some members of the TWITT group were working on a variable-geometry sailplane in San Diego in the mid-90's. I think they ran out of money after getting fairly far along. I believe the wing molds are in storage someplace.

The idea was to have a glider, which was statically stable with the wing panels swept, but statically
unstable - artificially stabilized - with the wing unswept. In the unswept configuration, there would be greater aerodynamic efficiency (an Oswald factor of one, essentially), with the less efficient swept configuration as a "limp home" mode if the stability-augmentation system failed.

(ed. – This must have been in response to something earlier, however, I am not quite sure what Marc is talking about since I don't recall TWITT ever discussing or planning an ultralight flying wing. If any of our long time members remember something I don't, please let me know.)

From: Russell Lee
<russlee_99@yahoo.com>

Subject: Re: Digest Number 1709

FYI, to fellow Nurflugel enthusiasts, the Smithsonian National Air and Space Museum owns a Horten Ho III f, Ho VI V2, and Ho III h.

The Ho III f and Ho VI V2 are now on public display at the Steven F. Udvar-Hazy Center. They are both suspended from the trusswork on the west side, at the middle of the aviation hanger, across from the Focke-Wulf Fw 190 and the Arado Ar 234.

The preserved center section of the Ho III h will go on exhibit later this month.

From: Andrea
<brownar@eircom.net>

Subject: IS there a Ho/Go 229 on display anywhere

Could someone tell me if there has ever been a Go/Ho229 on display anywhere, apart from the partially built one in the Smithsonian?

From: Bob Storck
<bstorck@sprynet.com>

Oh yes, at the Horten and Gotha Werk in 1944-45.

Seriously, barring undisclosed discoveries in the former Soviet sphere, insofar as I know, the incomplete Go229 in NASM storage is the sole survivor (of very few originals).

The Dulles facility is in the line of a storage display warehouse, not a theme museum like the main facility on the mall. Very little more than placards are used.

Let's not overlook the equally exciting and advanced projects from other nations, many already in the NASM collection. How about the Vought V-173, the Northrop N-1M and XP-56, Curtiss XP-55 and Douglas XB-43 or the Japanese Serian submarine carried pinpoint bomber or the Kikka and Okha jets (yes, NASM has a jet powered version), or the Irving night fighter. Also have one of the Avro saucers for UFO buffs. (BTW,
while lot of those German craft you mention only exist in sketch books, photos and memory, NASM has the Lippisch DM-1 plus an Arado 234, BV-155a. and Do335.)

I'm highly amused that so many German napkin scratches get treated as near operational facts, while a whole wealth of US and UK things that advanced to at least the mockup or even prototype stage get ignored. To say nothing of the whole panoply of amazing

variants that the Russians produced pre, during and post war. I especially liked the clever I-15 variant that had a Swiss-Army-knife mechanism that folded the bottom
wing into the top after takeoff.

From: Chad
<mtoreceptive@yahoo.com>

Here is a link to one in storage, also note the markings.

http://www.ipmsstockholm.org/magazine/1999/02/stuff_eng_detail_hoix.htm

(ed. – This looks like a very nice piece on the 229 and if you are looking for copies of the pictures in color this is the place.)

From: Douglas Russell-White
<dear_w2002@yahoo.com>

Subject: TO BRUNO ON PROFILES

Hi Bruno,

I'm interested in NACA – or NASA- GA (PC)-1 profile ordinates and polars. It is not in Selig's list. Any other source I might consult?

There are lots of sites offering Profili V2 for free, but since the download extensions are .exe they can be dangerous 'virus-wise'. Do you know of any safe place from where to download?

From: Bruno
<msmprod@optushome.com.au>

Profili V2 is CLEAN from viruses and SAFE, because it is checked automatically. I can vouch , knowing the author, Stefano Duranti, that he is a professional, careful and honest person. Profili V2 is the BEST software you can use. You can also create all the NACA profiles, if they are not in the already very capable list. I use it daily since four years ago: it is excellent. You can safely download the free version or upgrade (as I did) for a few dollars to the full version.

From: Douglas Russell-White
<dear_w2002@yahoo.com>

Subject: DIAGONAL RIBS

Can somebody tell me if using diagonal ribs in a wing –any wing- eliminates the need of internal bracing cables? I mean make all diagonal ribs instead of the usual straight ones.

From: Jim Sparks
<spider@candw.lc>

Some of the British Bombers during the Second World War used diagonal ribs and diagonal bracing for the fuselage. It created a light strong structure.

From: Huckebein
<milartjj@aol.com>

The Vickers Armstrong 'Wellington' was designed by Barnes Wallace, it's construction was geodetic in form though.

From: Douglas Russell-White
<dear_w2002@yahoo.com>

Thanks Jim, I knew about the Wellington; but my prject is a rather modest one, just a two place hidro. What I want to know is:

1- Assuming a 33 feet wing with a MAC of almost 60 inches, is there any advantage in using diagonal ribs alone, instead of the 'standard' parallel ribs plus internal bracing cables?
2- Where can I get the ordinates and polars of the GA(PC)-1 wing profile?

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